

**CHEMICAL COMPOSITIONS AND ABUNDANCE ANOMALIES  
IN STELLAR CORONAE ADP99**

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**Annual Report**

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Owing to Vinay Kashyap, the postdoctoral researcher on the project, having taken up a position at the Chandra X-ray Center last year, less work has been carried out than anticipated on this program. The situation has been exacerbated by the lack of promising candidates to fill the position, though a new hire is now expected shortly. Despite this, however, some very interesting and significant progress has been made.

We have been investigating different statistical methods for analysing the metal abundances of sources with low S/N. A Bayesian technique has been developed that determines the most probable line-to-continuum ratio in the source, thereby leading to the metallicity. This method is a promising approach with which to mine the ASCA archive. Some of this work has now been published in conference proceedings (van Dyk et al., 2002; Surlas et al. 2002).

The flavour of the project has changed very slightly in the last year owing to the increasing availability of several good quality Chandra HETG and LETG spectra for stars for which we had reduced and analysed ASCA data. The Chandra grating spectra in principle provide a means of calibrating the results from the low resolution ASCA spectra and we have started some work toward that goal. One paper concerning abundance ratios in active stars is appearing shortly in conference proceedings (Drake 2002) and is being readied for publication in a main-stream astrophysical journal. This paper demonstrates for the first time that abundance anomalies cannot be categorised simply in terms of First Ionisation Potential (FIP) or inverse-FIP based effects. Different Ne enhancements are found in different star types but a link between enhancement factors and stellar properties is not obvious. The publication noted as in preparation in an earlier report (Drake et al 2001), finding strong Ne enhancements in active stars, is now published. These results will again be used to "calibrate" low resolution results for which line ratio techniques cannot be employed.

In the future 12 months, with the new postdoc hire, we expect to apply the techniques and software developed to the extensive ASCA archive we have already began to analyse, in addition to Chandra and XMM archives as data become available.

#### References

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